

REMARKS

Background

Applicants acknowledge receipt of the Office action mailed January 31, 2007. Claims 1 to 18 were pending in the application at the time of the Office action. Claims 1 to 11 were rejected under 35 USC 102. Claims 1, 3 and 8-11 were said by the examiner to have been anticipated by United States patent 5,707,051 (Tsuji). Claims 1 to 11 were said by the examiner to have been anticipated by United States patent 6,611,417 (Chen). Claims 12 to 18 were rejected under 35 USC 103 (a), being said by the examiner to have been obvious given United States patent 6,244,942 (Zuniga) in view of United States patent 6,611,417 (Chen).

By this amendment, claims 1 to 11 have been deleted. Claim 12 is currently amended by the replacement of the reference to "the perforated plate as claimed in claim 1" by "a perforated plate" defined by wording taken from the now-deleted claim 1. The scope of claim 12 is not broadened by this amendment.

Claims 13 to 15 are original, and claims 16 to 18 are as previously presented. New claims 19 to 28 are added. These new claims are dependent, directly or indirectly, on claim 12 and generally take the substance of the perforated plate previously defined in claims 2 to 11 which are now deleted.

Upon entry of this amendment, claims 12 to 28 will be pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

Amendments to the Specification

The amendment to the paragraph bridging lines 30-31 on page 2 and lines 1-2 on page 3 amends the summary of the invention to accord with the amendment made to claim 12 as described below.

The paragraph bridging lines 5-17 on page 4 of the filed application is to be deleted.

Rejection under 35 U.S.C. § 102

Claims 1 to 11 were rejected under 35 USC 102. Claims 1, 3 and 8-11 were rejected as being anticipated by United States patent 5,707,051 (Tsuji). Claims 1 to 11 were rejected as being anticipated by United States patent 6,611,417 (Chen).

Claims 1 to 11 have been deleted by this amendment. Applicants submit that these rejections are now moot. In addition, none of the remaining pending claims are directed solely to a perforated plate.

Rejection under 35 U.S.C. § 103

Claims 12 to 18 were rejected under 35 USC 103 (a) as being unpatentable over United States patent 6,244,942 (Zuniga) in view of United States patent 6,611,417 (Chen). Applicants respectfully traverse this rejection.

Claim 12, both as previously presented and as currently pending, includes a perforated plate in a chamber. One face of the perforated plate has a plurality of grooves each of which interconnects a respective pair of through holes which extend between the faces of the plate. Furthermore, the plate of claim 12 is arranged for movement between two configurations. In one configuration, one face of the plate

contacts the inner face of a membrane which closes one side of a chamber. In the other configuration, the other face of the plate is in contact with an inner wall of the chamber.

United States patent 6,244,942 (Zuniga) describes support structure 114 which has plate portion 170 perforated with apertures 172. Zuniga does not describe this support structure as being movable so that the upper face, opposite the lower face that is adjacent to the flexible membrane 118, can contact the inner wall of the chamber 120, this inner wall being the underside of flexure ring 152.

United States patent 6,611,417 (Chen) also fails to describe the arrangement where the pedestal 34 with gas holes 36a, 36b and 36c is located in a chamber and moves between two configurations, in one of which configurations one face of the pedestal is in contact with an inner wall of the chamber, as claimed in claim 12 of the current application.

Applicants submit that because neither of the cited documents discloses the arrangement as claimed in claim 12, the obviousness objection should be withdrawn. Applicants further submit that claims 13 to 18, being dependent on claim 12, cannot be said to be obvious when claim 12 is not so.

In the prior art cited under USC 35 103(a), there is no teaching of any contact between a perforated plate located in a chamber and an inner wall of the chamber.

In the current application, the apparatus as claimed in claim 12 relies on the above-mentioned contact between the perforated plate and the inner wall of the chamber to provide back pressure for the wafer being held by the chuck apparatus for surface polishing or other similar process. This is distinguished from the carrier head described in United States patent 6,244,942 (Zuniga) which uses fluid pressure applied in chambers behind the supported wafer to apply a load, in the form of a downward pressure, to a polishing pad.

Reference is made to the passage from line 67 of column 4 to line 2 of column 5 of Zuniga which states "When fluid is pumped into loading chamber 108 and base 104 is pushed downwardly, retaining ring 110 is also pushed downwardly to apply a load to polishing pad 32.", and to the passage at lines 10-12 of column 6 which states "In operation, fluid is pumped into chamber 120 to control the downward pressure applied to the substrate by flexible membrane 118."

Applicants also note that US patent 6,611,417 (Chen) describes a chuck system that "can be an electrostatic chuck system or other types of chuck systems, such as the traditional mechanical chuck systems." There is no description in Chen of the chuck being a vacuum chuck. The plurality of gas holes 36a, 36b and 36c passing through the pedestal 34 are not provided for application of a vacuum as is envisaged in the current application. Rather, "the gas holes 36a, 36b and 36c provide channels for gas to reach the back side (of) semi-conductor wafer 32 in order to serve as a thermal transfer medium."

The applicants respectfully submit that it would not have been obvious to one of ordinary skill in the art to have provided the apparatus described in US patent 6,244,942 (Zuniga) with the perforated plate as taught by US patent 6,611,417 (Chen) to allow gas to flow evenly across the back surface of a chucked wafer when it was not envisaged in either of these documents that the back surface of the perforated plate would be in contact with the opposing inner wall surface of the chamber 120.

It is the network of grooves in the perforated plate of the current application, as claimed in claim 12, and the groove or grooves in the inner chamber wall, as claimed in claim 14, which allow gas to flow across the back surface of the perforated plate when the perforated plate is in contact with the inner chamber wall thereby allowing a vacuum to be evenly applied and maintained across the back of the membrane while back pressure is applied to the supported wafer.

New Claims

New claims 19 through 28 are supported by the application as originally filed. Accordingly, no new matter is introduced by the addition of these claims. New claims 19 to 28 depend either directly or indirectly from amended claim 12, which Applicants believe to be allowable in view of the above amendments and remarks. As such, Applicants believe that new dependent claims 19 through 28 are also allowable at least by virtue of their dependence from independent claim 1.

In addition, claims 19 through 28 are also believed to be patentably distinguishable over the cited patents because the cited patents do not disclose, teach, or suggest the additional features as required by these claims (in combination with features recited in the independent claim from which they depend). For example, the cited patents do not disclose, teach, or suggest:

“wherein two of the through holes are located at different radial distances from a central zone of the plate and are interconnected by at least one of the grooves” (as recited by claim 19);

“wherein at least one of the grooves extends through a substantially central zone on the first face of the plate” (as recited by claim 20);

“wherein one or more of the grooves extends diametrically across the central zone to interconnect a respective pair of the through holes, two or more of the through holes lie on a common radius extending from the central zone with each pair of adjacent through holes lying on the common radius being interconnected by a respective groove” (as recited by claim 21);

“wherein respective pluralities of the through holes are arranged to lie on substantially concentric circles” (as recited by claim 22);

"wherein at least one of the through holes does not lie on a radius in common with other through holes but is interconnected by a respective pair of the grooves to the two closest radially-inward through holes" (as recited by claim 23);

"wherein respective pluralities of the through holes are arranged to lie on substantially concentric circles" (as recited by claim 24);

"wherein the faces of the plate are substantially parallel" (as recited by claim 25);

"wherein the plate is substantially circular" (as recited by claim 26);

"wherein the faces of the plate are substantially parallel and the plate is substantially circular" (as recited by claim 27); and


"wherein the grooves are pressure-equalizing passages interconnecting respective pairs of the through holes and the grooves allow flow of fluid to substantially equalize fluid pressure in the through holes" (as recited by claim 28).

Conclusion

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (314) 446-7636.

Respectfully submitted,

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By: 
Brian G. Panka, Reg. No. 53,430

HARNES, DICKEY & PIERCE, P.L.C.
7700 Bonhomme Avenue
Suite 400
St. Louis, Missouri 63105
(314) 726-7500

BGP/lbs